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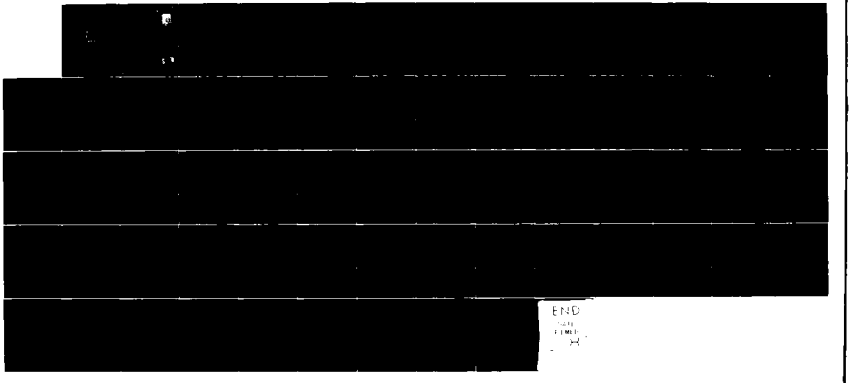

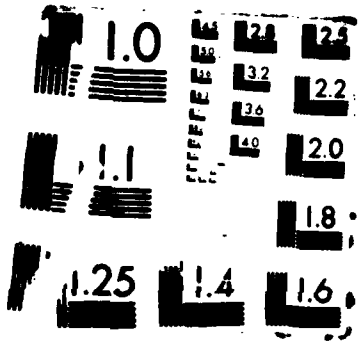
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AFWAL-TR-86-4006
Volume V
Part 19

INTEGRATED INFORMATION SUPPORT SYSTEM (IISS)
Volume V - Common Data Model Subsystem
Part 19 - NDML Precompiler Generate Oracle Request Processor Product Specification

General Electric Company
Production Resources Consulting
One River Road
Schenectady, New York 12345

Final Report for Period 22 September 1980 - 31 July 1985

November 1985

Approved for public release; distribution is unlimited.

MATERIALS LABORATORY
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19. ABSTRACT (Continue on reverse if necessary and identify by block number)

This document is the product specification establishing the design implementation of the IISS Configuration Item PRE9.2 which will generate a processor to satisfy data requests from an ORACLE database.

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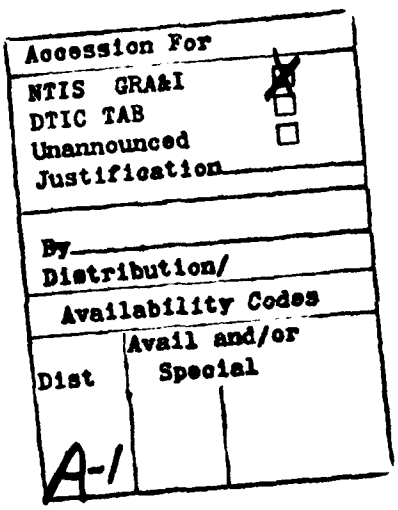

PREFACE

This product specification covers the work performed under Air Force Contract F33615-80-C-5155 (ICAM Project 6201). This contract is sponsored by the Materials Laboratory, Air Force Systems Command, Wright-Patterson Air Force Base, Ohio. It was administered under the technical direction of Mr. Gerald C. Shumaker, ICAM Program Manager, Manufacturing Technology Division, through Project Manager, Mr. David Judson. The Prime Contractor was Production Resources Consulting of the General Electric Company, Schenectady, New York, under the direction of Mr. Alan Rubenstein. The General Electric Project Manager was Mr. Myron Hurlbut of Industrial Automation Systems Department, Albany, New York.

Certain work aimed at improving Test Bed Technology has been performed by other contracts with Project 6201 performing integrating functions. This work consisted of enhancements to Test Bed software and establishment and operation of Test Bed hardware and communications for developers and other users. Documentation relating to the Test Bed from all of these contractors and projects have been integrated under Project 6201 for publication and treatment as an integrated set of documents. The particular contributors to each document are noted on the Report Documentation Page (DD1473). A listing and description of the entire project documentation system and how they are related is contained in document FTR620100001, Project Overview.

The subcontractors and their contributing activities were as follows:

TASK 4.2

Subcontractors	Role
Boeing Military Aircraft Company (BMAC)	Reviewer.
D. Appleton Company (DACOM)	Responsible for IDEF support, state-of-the-art literature search.
General Dynamics/ Ft. Worth	Responsible for factory view function and information models.

Subcontractors	Role
Illinois Institute of Technology	Responsible for factory view function research (IITRI) and information models of small and medium-size business.
North American Rockwell	Reviewer.
Northrop Corporation	Responsible for factory view function and information models.
Pritsker and Associates	Responsible for IDEF2 support.
SofTech	Responsible for IDEF0 support.

TASKS 4.3 - 4.9 (TEST BED)

Subcontractors	Role
Boeing Military Aircraft Company (BMAC)	Responsible for consultation on applications of the technology and on IBM computer technology.
Computer Technology Associates (CTA)	Assisted in the areas of communications systems, system design and integration methodology, and design of the Network Transaction Manager.
Control Data Corporation (CDC)	Responsible for the Common Data Model (CDM) implementation and part of the CDM design (shared with DACOM).
D. Appleton Company (DACOM)	Responsible for the overall CDM Subsystem design integration and test plan, as well as part of the design of the CDM (shared with CDC). DACOM also developed the Integration Methodology and did the schema mappings for the Application Subsystems.

Subcontractors	Role
Digital Equipment Corporation (DEC)	Consulting and support of the performance testing and on DEC software and computer systems operation.
McDonnell Douglas Automation Company (McAuto)	Responsible for the support and enhancements to the Network Transaction Manager Subsystem during 1984/1985 period.
On-Line Software International (OSI)	Responsible for programming the Communications Subsystem on the IBM and for consulting on the IBM.
Rath and Strong Systems Products (RSSP) (In 1985 became McCormack & Dodge)	Responsible for assistance in the implementation and use of the MRP II package (PIOS) that they supplied.
SofTech, Inc.	Responsible for the design and implementation of the Network Transaction Manager (NTM) in 1981/1984 period.
Software Performance Engineering (SPE)	Responsible for directing the work on performance evaluation and analysis.
Structural Dynamics Research Corporation (SDRC)	Responsible for the User Interface and Virtual Terminal Interface Subsystems.

Other prime contractors under other projects who have contributed to Test Bed Technology, their contributing activities and responsible projects are as follows:

Contractors	ICAM Project	Contributing Activities
Boeing Military Aircraft Company (BMAC)	1701, 2201, 2202	Enhancements for IBM node use. Technology Transfer to Integrated Sheet Metal Center (ISMC).

Contractors	ICAM Project	Contributing Activities
Control Data Corporation (CDC)	1502, 1701	IISS enhancements to Common Data Model Processor (CDMP).
D. Appleton Company (DACOM)	1502	IISS enhancements to Integration Methodology.
General Electric	1502	Operation of the Test Bed and communications equipment.
Hughes Aircraft Company (HAC)	1701	Test Bed enhancements.
Structural Dynamics Research Corporation (SDRC)	1502, 1701, 1703	IISS enhancements to User Interface/Virtual Terminal Interface (UI/VTI).
Systran	1502	Test Bed enhancements. Operation of Test Bed.

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SECTION 1

SCOPE

1.1 Identification

This specification establishes the design of Function PRE9.2, "Generate ORACLE Request Processor", one of the major functions of the Configuration Item (CI) "Precompiler" to be built and formally accepted by the ICAM Program office. This CI constitutes one of the subsystems of the Common Data Model Processor (CDMP).

1.2 Functional Summary

The purpose of this Computer Program Configuration Item (CPCI) is to generate a COBOL program that will satisfy a retrieval or update NDML subtransaction against an ORACLE database.

The following functions will be performed by this CPCI:

1. Generate the Data Division section of the Request Processor:

   a) Generate file description and record layout if the NDML request resulted in a retrieval subtransaction.

2. Generate the Working Storage Section of the Request Processor. These working storage variables will be used for:

   a) Conceptual/internal transformation of retrieval search parameters or update values.
   b) Internal/Conceptual transformation of retrieved data fields
   c) DBMS status checks
   d) Retrieved qualification variables
   e) ORACLE SQL statements to access the database.

3. Generate the Procedure Division section of the Request Processor. It will include all the code to access a particular ORACLE database in order to satisfy the NDML request. This code will consist of:

   a) Interface code to the Request Processor Main program at runtime

b) Code to transform the retrieval search parameters or update values from conceptual to internal format.

c) Code using DBMS specific calls to access the database to retrieve data or update data.

d) Code to transform the retrieved data from internal to conceptual format.

e) Code to save the retrieved data on a sequential file.

f) Code to check DBMS status and report errors during runtime execution.

SECTION 2

DOCUMENTS

2.1 Reference Documents

1. ICAM Documentation Standards: IDS15012000A, 28 December 1981.

2. D. Appleton Co., CDM Administrator's Manual; UM620141000, March 1984.

3. D. Appleton Co., CDM1-IDEF Model of the Common Data Model; CCS620141000, 15 May 1985.

4. D. Appleton Co., Computer Program Development Specification (DS) ICAM Integrated Support System (IISS) Configuration Item: NDML Precompiler; DS620141200, October 1984.

5. D. Appleton Co., Embedded NDML Programmer's Reference Manual; PRM 620141200, March 1985.

6. Softech, Inc., NTM Programmer's Guide; UM620140001, July 1984.

7. Control Data Corp., Computer Program Development Specification (DS) for ICAM Integrated Support System (IISS) Configuration Item: NDDL Command Processor: DS620141100, June 1985.

2.2 Terms and Abbreviations

Attribute Use Class: (AUC)

Conceptual Schema: (CS)

Common Data Model Processor: (CDMP)

Common Data Model: (CDM) Describes common data application process formats, form definitions, etc, of the IISS and includes conceptual schema, external, internal schemas, and schema transformation operators.

Data Field: (DF) An element of data in the external schema. It is by this name that an NDML programmer references

data.

Database Management System: (DBMS)

Distributed Request Supervisor: (DRS) This IISS CDM subsystem configuration item controls the execution of distributed NDML queries and non distributed updates.

Domain: A logical definition of legal attribute class values.

Domain Constraint: Predicate that applies to a single domain.

External Schema: (ES)

Forms: Structured views which may be imposed on windows or other forms. A form is composed of fields where each field is a form, item, or window.

Forms Processor: (FP) A set of callable execution time routines available to an application program for form processing.

Internal Schema: (IS)

Integrated Information Support System: (IISS) A test computing environment used to investigate, demonstrate and test the concepts of information management and information integration in the context of Aerospace Manufacturing. The IISS addresses the problems of integration of data resident on heterogeneous databases supported by heterogeneous computers interconnected via a local Area Network.

Mapping: The correspondence of independent objects in two schemas: ES to CS or CS to IS.

Network Transaction Manager: (NTM) Performs the coordination, communication and housekeeping functions required to integrate the application processes and system services resident on the various hosts into a cohesive system.

Neutral Data Manipulation Language: (NDML) A language developed by the IISS project to provide uniform access to common data, regardless of database manager or distribution criteria. It provides distributed retrieved and single node updates.

ORACLE: Relational DBMS based on the SQL (Structured Query Language, a product of ORACLE Corp, Menlo Park, CA). The CDM is an ORACLE database.

Parcel: A sequential file containing section source code of the input application program.

Request Processor: (RP) A COBOL program that will satisfy a retrieval or update NDML subtransaction against a particular Database Management System.

User Interface: (UI) Controls the user's terminal and interfaces with the rest of the system.

Virtual Terminal Interface: (VTI) Performs the interfacing between different terminals and the UI. This is done by defining a specific set of terminal features and protocols which must be supported by UI software which constitutes the Virtual Terminal Definition. Specific terminals are then mapped against the Virtual Terminal software by specific software modules written for each type of real terminal supported.

SECTION 3

REQUIREMENTS

3.1 Structural Description

A graphic portrayal of this CPCI is included in Section 3.10. This chart shows the hierarchical relationships of each module making up this CPCI.

This CPCI uses a number of lower level modules to handle specific operations such as:

1. Generate conceptual schema data definitions for retrieved data fields (CDRFT).

2. Generate internal schema data definitions for runtime search parameters (CDPRM).

3. Generate internal schema data definitions for retrieved data fields (CDRDF).

4. Generate conceptual schema data definitions for runtime search parameters or update values (CDMSG).

5. Generate working storage and procedure division code for the conceptual schema to internal schema transformation of runtime search parameters or update values (CDCI).

6. Generate working storage and procedure division code for the internal schema to conceptual schema transformation of retrieved data fields (CDIC).

7. Generate internal schema data definitions for qualified data fields (CDQDF).

8. Combine two work files into one file containing the Request Processor program (CDCWF).

9. Generate macros with the proper substitution parameters (CDMACR).

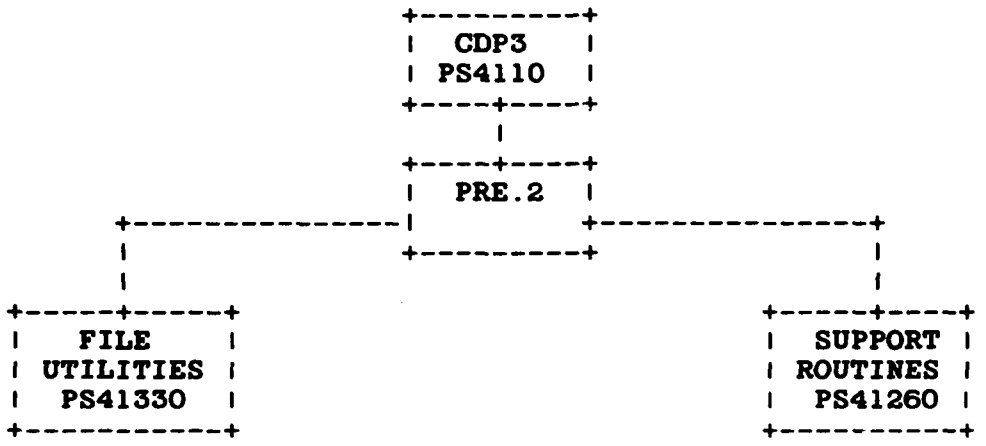
3.2 Functional Flow

This CPCI implements the logic defined in the Development Specification for this CPCI. Details of inputs/outputs and relationships between modules are to be found in Section 3.10.

This CPCI has been designated to operate in a batch or interactive mode. It must operate in the system environment established for IISS; that is, use of the Network Transaction Manager. It must use the ORACLE DBMS installed on a DEC VAX computer.

3.3 Interfaces

The following diagram depicts the interface of PRE9.2 with other CPCI's in the system.



3.3.1 Inputs/Outputs

The following table depicts the inputs and outputs of this CPCI. A detailed description for each item can be found in the DS for this CPCI.

FUNCTION: PRE9.2

INPUT	OUTPUT
Database Identification Number	Source code file name
Database Name	Function Status
Library Name	
Target Host	
Current Host	
Request Processor Name	
Current Subtransaction	
Internal Schema Action List	
Internal Schema Qualify List	
Conceptual Schema Action list	
Conceptual Schema Qualify list	
Result Field table	
ORACLE Logon Data Area	
Error File Name	

3.4 Program Interrupts

Not applicable to this CPCI.

3.5 Timing and Sequencing Description

This CPCI is called upon by the Request Processor Control Module CDP13, for every ORACLE subtransaction identified by the current NDML request being precompiled.

3.6 Special Control Features

Not applicable to this CPCI.

3.7 Storage Allocation

3.7.1 Database Definition

The database used by this CPCI is the Common Data Model (CDM) database. This model is defined by the CDM1, the IDEF1 model of the CDM, Reference Number 3. The database was constructed using ORACLE.

3.7.1.1 File Description

No permanent files have been defined for this CPCI. It uses temporary scratch files for the generated program source code.

3.7.1.2 Table Description

All tables used by this CPCI have been defined by the Development Specification for this CPCI.

3.7.1.3 Item Description

Not applicable to this CPCI.

3.8 Object Code Creation

The object code for this CPCI will be created by the system integration test team by using defined IISS Software Configuration Management procedures. This CPCI will use the COBOL language compiler.

3.9 Adaptation Data

This CPCI has been coded using ANSI COBOL, and FORTRAN. The intents was to provide a transportable system. Any system environment supporting these languages, a virtual memory management scheme, the COMM and NTM subsystems of IISS and the ORACLE Database Management System should be able to support this CPCI. Every possible attempt has been made to localize and identify any machine or environment dependent modules through the original design of the IISS and application of Configuration Management Procedures.

3.10 Detail Design Description

The following sections have been computer generated for this CPCI.

3.10.1 Main Program List

The following is a list of all "Main Programs" which are modules that are not called by any other module being documented here. These modules are either program entry points or, if they are hooked into another set of programs via subroutine calls, they are the points the external programs can call and therefore enter through. To differentiate between the two types of entry points, look at the individual Module Documentation (section 3.10.8) and look at Module Type for each of the Main Program modules listed. Note whether the routine is a Program, Subroutine, or Function. If it is a Program, it is truly a main program entry point. If not, then it is merely called by other programs not being documented here.

GENERATE ORACLE RP Main Program List

Module Name	Purpose
CDQPO	GENERATE REQUEST PROCESSOR FOR ORACLE DATA BASE

3.10.2 Module List

The following is a list of all the modules being documented here along with their purpose. Each module has a unique name, no matter what language it was written in.

GENERATE ORACLE RP Module List

Module Name	Purpose
CDQPO	GENERATE REQUEST PROCESSOR FOR ORACLE DATA BASE

3.10.3 External Routines List

The following is a list of all routines or functions not documented here that are called by modules that are documented here. The first caller, in alphabetical order, is listed as well. The specification in which any module is documented may be found in the Module Documentation Index (Document Number CM 620100001). See section 3.10.6 for a list of the modules that call each of these external routines.

GENERATE ORACLE RP External Routines List

Module Name	First User
CDCI	CDQPO
CDCWF	CDQPO
CDIC	CDQPO
CDMACR	CDQPO
CDMSG	CDQPO
CDPRM	CDQPO
CDRDF	CDQPO
CDRFT	CDQPO
ERRPRO	CDQPO
GENFIL	CDQPO
RPTERR	CDQPO

3.10.4 Include File List

The following is a list of all include files called in by modules being documented here. Each include file has a unique name regardless of the language being used. The purpose of each include file is listed as well. A more complete description of each include file is given in section 3.10.9. The purpose listed is the one that is in the source code of the include file.

A purpose of "**** PURPOSE NOT FOUND BY STRIPPER ****" indicates that a purpose statement was not written into the include file itself. The most common reason for this is that the include file comes from system libraries that were not developed by the project, such as 'C' libraries that are provided with the 'C' compiler.

See section 3.10.6 for a set of lists which show all the modules which call in each of these include files.

GENERATE ORACLE RP Include File List

File Name	Purpose
ALFABET	LETTERS CONTAINED IN THE ENGLISH ALPHABET
COBLINE	COBOL SOURCE CODE LINE DESCRIPTION
CONFLD	WORKING STORAGE FOR CONVERSION OF VARIABLES
CSAL	CONCEPTUAL SCHEMA ACTION LIST
CSQUAL	CONCEPTUAL SCHEMA QUALIFY LIST
ERRCDM	IISS ERROR STATUS CODES FOR CDMP MODULES
ERRPRO	**** PURPOSE NOT FOUND BY STRIPPER ****
FILSTAT	VARIABLE DEFINITION FOR FILE STATUS
ISAL	INTERNAL SCHEMA ACTION LIST
ISQUAL	INTERNAL SCHEMA QUALIFY LIST
MACDAT	WS VARIABLES FOR MACRO COPY UTILITY
ORCLEDA	WS DEFINITION FOR THE ORACLE LOGIN AREA
PAR2FD	PARCEL 2 FILE DESCRIPTION
RFTABLE	THE RESULT FIELD TABLE
SBSTLST	WS DEFINITION FOR THE SUBSTITUTION LIST TABLE
SRVRET	AS THE RETURN GIVEN A TABLE-FULL ERROR

3.10.5 Where Include File Used List

The following lists each include file from 3.10.4 and all the modules documented in this specification which include them. The purpose of each module is listed as well.

GENERATE ORACLE RP Where-include-file-used List

Include File	Module Name	Module Purpose
ALFABET	CDQPO	GENERATE REQUEST PROCESSOR FOR ORACLE DATA BASE
COBLINE	CDQPO	GENERATE REQUEST PROCESSOR FOR ORACLE DATA BASE
CONFLD	CDQPO	GENERATE REQUEST PROCESSOR FOR ORACLE DATA BASE
CSAL	CDQPO	GENERATE REQUEST PROCESSOR FOR ORACLE DATA BASE
CSQUAL	CDQPO	GENERATE REQUEST PROCESSOR FOR ORACLE DATA BASE
ERRCDM	CDQPO	GENERATE REQUEST PROCESSOR FOR ORACLE DATA BASE

GENERATE ORACLE RP Where-include-file-used List

Include File	Module Name	Module Purpose
ERRPRO	CDQPO	GENERATE REQUEST PROCESSOR FOR ORACLE DATA BASE
FILSTAT	CDQPO	GENERATE REQUEST PROCESSOR FOR ORACLE DATA BASE
ISAL	CDQPO	GENERATE REQUEST PROCESSOR FOR ORACLE DATA BASE
ISQUAL	CDQPO	GENERATE REQUEST PROCESSOR FOR ORACLE DATA BASE
MACDAT	CDQPO	GENERATE REQUEST PROCESSOR FOR ORACLE DATA BASE
ORCLEDA		

GENERATE ORACLE RP Where-include-file-used List

Include File	Module Name	Module Purpose
	CDQPO	GENERATE REQUEST PROCESSOR FOR ORACLE DATA BASE
PAR2FD	CDQPO	GENERATE REQUEST PROCESSOR FOR ORACLE DATA BASE
RFTABLE	CDQPO	GENERATE REQUEST PROCESSOR FOR ORACLE DATA BASE
SBSTLST	CDQPO	GENERATE REQUEST PROCESSOR FOR ORACLE DATA BASE
SRVRET	CDQPO	GENERATE REQUEST PROCESSOR FOR ORACLE DATA BASE

3.10.6 Where External Routine Used List

The following lists each external function or routine listed in 3.10.3 and all the documented modules which call it. The purpose of each module is listed as well.

GENERATE ORACLE RP Where-external-routine-used List

System Module	Module Name	Module Purpose
CDCI	CDQPO	GENERATE REQUEST PROCESSOR FOR ORACLE DATA BASE
CDCWF	CDQPO	GENERATE REQUEST PROCESSOR FOR ORACLE DATA BASE
CDIC	CDQPO	GENERATE REQUEST PROCESSOR FOR ORACLE DATA BASE
CDMACR	CDQPO	GENERATE REQUEST PROCESSOR FOR ORACLE DATA BASE
CDMSG	CDQPO	GENERATE REQUEST PROCESSOR FOR ORACLE DATA BASE
CDPRM	CDQPO	GENERATE REQUEST PROCESSOR FOR ORACLE DATA BASE
CDRDF	CDQPO	GENERATE REQUEST PROCESSOR FOR ORACLE DATA BASE

GENERATE ORACLE RP Where-external-routine-used List

System Module	Module Name	Module Purpose
CDRFT	CDQPO	GENERATE REQUEST PROCESSOR FOR ORACLE DATA BASE
ERRPRO	CDQPO	GENERATE REQUEST PROCESSOR FOR ORACLE DATA BASE
GENFIL	CDQPO	GENERATE REQUEST PROCESSOR FOR ORACLE DATA BASE
RPTERR	CDQPO	GENERATE REQUEST PROCESSOR FOR ORACLE DATA BASE

3.10.7 Main Program Parts List

The following lists each Main Program listed in 3.10.1 and all the modules which are called either by that module itself or by any of the documented modules which it calls. It is possible for a non-main module to be listed more that once if it is called by multiple modules. The called modules, in this case known as program parts, are marked as to whether they are documented here. If so, the phrase "well-defined module" appears by the module name, if not it is an "external "routine". The Purpose of the Main Program module is listed as well.

GENERATE ORACLE RP Main Program Parts List

Main Pgm Name	Module Name	Module Type
CDQPO	Purpose--›	GENERATE REQUEST PROCESSOR FOR ORACLE DATA BASE
	CDCI	External routine
	CDCWF	External routine
	CDIC	External routine
	CDMACR	External routine
	CDMSG	External routine
	CDPRM	External routine
	CDRDF	External routine
	CDRFT	External routine
	ERRPRO	External routine
	GENFIL	External routine
	RPTERR	External routine

3.10.8 Module Documentation

The following documentation describes information which is specific to each individual module being documented in this specification as listed in section 3.10.2. It provides a compact way of getting information that would be otherwise buried within each module's source code.

The specific items in this module documentation have the following meanings:

NAME:	Name of program Module.
PURPOSE:	Purpose of Module as detailed in the source code.
LANGUAGE:	Programming language source code is written in. The choices are: VAX-11 FORTRAN C (I/S-1 Workbench 'C') VAX-11 COBOL
MODULE TYPE:	Whether a Program, Subroutine, or Function.
SOURCE FILE:	Name of Source File from file specification.
SOURCE FILE TYPE:	Source File Extension from file specification.
HOST:	Whether this is a host-dependent routine (VAX or IBM) or blank if host-independent.
SUBSYSTEM:	IISS sub-system this file resides in.
SUBDIRECTORY:	Sub-directory of that subsystem in which this file resides.
DOCUMENTATION GROUP:	Name of documentation group of which this source file is a member.
DESCRIPTION:	A description of the module as otained from the source code.

ARGUMENTS:	The arguments with which this routine is called if it is a Subroutine or a Function.
INCLUDE FILES:	A list of all the files that are included into this module as well as their purposes.
ROUTINES CALLED:	Subroutines or Functions, either documented or external, called by this module, if any.
CALLED DIRECTLY BY:	The documented routines which call this module, if any.
USED IN MAIN PROGRAM(S):	The documented Main Programs which contain this module in their parts list according to the list in section 3.10.7.

The Module Documentation is arranged alphabetically according to Module Name.

GENERATE ORACLE RP Module Documentation

NAME: CDQPO
PURPOSE: GENERATE REQUEST PROCESSOR FOR ORACLE DATA BASE
LANGUAGE: VAX-11 COBOL
MODULE TYPE: SUBROUTINE
SOURCE FILE: CDQPO
SOURCE FILE TYPE: .COB
HOST:
SUBSYSTEM: CDM
SUBDIRECTORY:
DOCUMENTATION GROUP: PS41254

DESCRIPTION:

- THIS PROGRAM GENERATES A COBOL PROGRAM MAKING CALLS TO THE ORACLE RELATIONAL-CALCULUS (IMPLIED JOINS) DATA BASE MANAGER. THIS IS A MAIN PROGRAM STARTED BY THE CDM PRECOMPILER AND GENERATES A FILE OF COBOL SOURCE CODE THAT MUST BE COMPILED ON THE MACHINE.
THE GENERATED CODE HAS COPY STATEMENTS IN IT.

ARGUMENTS:

QPGO-DBID = DSPLY [9(5)]
QPGO-DB-NAME = DSPLY [X(30)]
QPGO-LIB-NAME = DSPLY [X(30)]
HOST-ID = DSPLY [XXX]
MY-HOST = DSPLY [XXX]
QPGO-QPID = DSPLY [X(10)]
QPGO-SUBTRANS = DSPLY [999]
IS-ACTION-LIST = RECRD
IS-QUALIFY-LIST = RECRD
CS-ACTION-LIST = RECRD
CS-QUALIFY-LIST = RECRD
RFT = RECRD
ORACLE-LDA = RECRD
ERROR-FILE = DSPLY [X(30)]
GEN-FILE-NAME = DSPLY [X(30)]
RET-STATUS = DSPLY [X(5)]

INCLUDE FILES:

ERRCDM	- IISS ERROR STATUS CODES FOR CDMP MODULES
FILSTAT	- VARIABLE DEFINITION FOR FILE STATUS
SRVRET	- AS THE RETURN GIVEN A TABLE-FULL ERROR
PAR2FD	- PARCEL 2 FILE DESCRIPTION
COBLINE	- COBOL SOURCE CODE LINE DESCRIPTION
CONFLD	- WORKING STORAGE FOR CONVERSION OF VARIABLES
ALFABET	- LETTERS CONTAINED IN THE ENGLISH ALPHABET
MACDAT	- WS VARIABLES FOR MACRO COPY UTILITY
SBSTLST	- WS DEFINITION FOR THE SUBSTITUTION LIST TABLE
ISAL	- INTERNAL SCHEMA ACTION LIST
ISQUAL	- INTERNAL SCHEMA QUALIFY LIST
CSAL	- CONCEPTUAL SCHEMA ACTION LIST
CSQUAL	- CONCEPTUAL SCHEMA QUALIFY LIST
RFTABLE	- THE RESULT FIELD TABLE
ORCLEDA	- WS DEFINITION FOR THE ORACLE LOGIN AREA
ERRPRO	- **** PURPOSE NOT FOUND BY STRIPPER ****

ROUTINES CALLED:

- GENFIL
- CDRFT
- CDCWF
- CDPRM
- CDRDF
- CDMSG
- CDCI
- CDIC
- CDMACR
- RPTERR
- ERRPRO

3.10.9 Include File Descriptions

The following list contains a purpose and description of each include file listed in 3.10.4 as specified in the source code. The language it is written in is also given.

GENERATE ORACLE RP Include File Description

FILE NAME: ALFABET
PURPOSE: LETTERS CONTAINED IN THE ENGLISH ALPHABET
LANGUAGE: VAX-11 COBOL

DESCRIPTION:

THIS IS THE ENGLISH ALPHABET, THE LETTERS ARE USED

GENERATE ORACLE RP Include File Description

FILE NAME: COBLINE
PURPOSE: COBOL SOURCE CODE LINE DESCRIPTION
LANGUAGE: VAX-11 COBOL

DESCRIPTION:

GENERATE ORACLE RP Include File Description

FILE NAME: CONFLD
PURPOSE: WORKING STORAGE FOR CONVERSION OF VARIABLES
LANGUAGE: VAX-11 COBOL

DESCRIPTION:

GENERATE ORACLE RP Include File Description

FILE NAME: CSAL
PURPOSE: CONCEPTUAL SCHEMA ACTION LIST
LANGUAGE: VAX-11 COBOL

DESCRIPTION:

TABLE TO HOLD CONCEPTUAL DATA ABOUT THE REQUEST

***** THE CONCEPTUAL SCHEMA ACTION LIST

GENERATE ORACLE RP Include File Déscription

FILE NAME: CSQUAL
PURPOSE: CONCEPTUAL SCHEMA QUALIFY LIST
LANGUAGE: VAX-11 COBOL

DESCRIPTION:

CONTAINS CONCEPTUAL SCHEMA INFORMATION FOR
THE REQUESTS QUALIFICATION

THE CONCEPTUAL SCHEMA QUALIFY LIST

GENERATE ORACLE RP Include File Description

FILE NAME: ERRCDM
PURPOSE: IISS ERROR STATUS CODES FOR CDMP MODULES
LANGUAGE: VAX-11 COBOL

DESCRIPTION:

CONTAINS ALL ERROR CODES USED BY CDMP *
MODULES FOR ERROR HANDLING *

GENERATE ORACLE RP Include File Description

FILE NAME: FILSTAT
PURPOSE: VARIABLE DEFINITION FOR FILE STATUS
LANGUAGE: VAX-11 COBOL

DESCRIPTION:

FILE USAGE FILE STATUS PARAMETER

```
FILSTAT
      FILE USAGE FILE STATUS PARAMETER
        SIZE AND THE 88 VALUE ARE PROBABLY MACHINE
             DEPENDENT
(THIS IS FOR VAX-11 COBOL)
```

GENERATE ORACLE RP Include File Description

FILE NAME: ISAL
PURPOSE: INTERNAL SCHEMA ACTION LIST
LANGUAGE: VAX-11 COBOL

DESCRIPTION:

CONTAINS INTERNAL SCHEMA INFORMATION ABOUT AN NDML REQUEST

THE INTERNAL SCHEMA ACTION LIST

GENERATE ORACLE RP Include File Description

FILE NAME: ISQUAL
PURPOSE: INTERNAL SCHEMA QUALIFY LIST
LANGUAGE: VAX-11 COBOL

DESCRIPTION:

CONTAINS INTERNAL SCHEMA INFORMATION FOR AN
NDML QULIFICATION

THE INTERNAL SCHEMA QUALIFY LIST

GENERATE ORACLE RP Include File Description

FILE NAME: MACDAT
PURPOSE: WS VARIABLES FOR MACRO COPY UTILITY
LANGUAGE: VAX-11 COBOL

DESCRIPTION:

GENERATE ORACLE RP Include File Description

FILE NAME: ORCLEDA
PURPOSE: WS DEFINITION FOR THE ORACLE LOGIN AREA
LANGUAGE: VAX-11 COBOL

DESCRIPTION:

THE ORACLE LOGON DATA AREA

GENERATE ORACLE RP Include File Description

FILE NAME: PAR2FD
PURPOSE: PARCEL 2 FILE DESCRIPTION
LANGUAGE: VAX-11 COBOL

DESCRIPTION:

GENERATE ORACLE RP Include File Description

FILE NAME: RFTABLE
PURPOSE: THE RESULT FIELD TABLE
LANGUAGE: VAX-11 COBOL

DESCRIPTION:

CONTAINS CONCEPTUAL SCHEMA INFORMATION ABOUT
THE RESULTS OF AN NDML REQUEST

THE RESULT FIELD TABLE

GENERATE ORACLE RP Include File Description

FILE NAME: SBSTLST
PURPOSE: WS DEFINITION FOR THE SUBSTITUTION LIST TABLE
LANGUAGE: VAX-11 COBOL

DESCRIPTION:

SUBSTITUTION-LIST REPRESENTS THE INPUT TABLE
OF SUBSTITUTION PARAMETERS FOR THE CDMACR
MACRO EXPANSION SUBROUTINE

GENERATE ORACLE RP Include File Description

```
FILE NAME: SRVRET
PURPOSE:   AS THE RETURN GIVEN A TABLE-FULL ERROR
LANGUAGE:  VAX-11 COBOL

DESCRIPTION:
------------
   MODIFIED 11/2/83 TO INCLUDE RET-CODE-5                          *
   MODIFIED 1/9/84 TO INCREASE ALL ERROR CODES TO PIC X(5)         *
     AND TO ELIMINATE ALPHA'S                                      *
   MODIFIED 1/26/84 TO ADD RET-CODE FOR GETUSR-NOT-SUCC            *
   SRV-SUCCESSFUL ADDED FOR GENERIC RETURN                         *
   MODIFIED 2/7/84 TO ADD ERROR CODES FOR ENTRY-NOT-FOUND          *
   MODIFIED 2/8/84 TO ADD WHTHST-NOT-SUCCESSFUL                    *
   MODIFIED 2/20/84 TO ADD TSTMOD NEW CODES.                       *
      MODIFIED 20 AUG 84 INITALIZE ALL LOCAL VARAIBLES TO
               SPACES OR 0.
   MODIFIED 5/21/85 TO ADD RCL AND FILGEN RETURN CODES
```

GENERATE ORACLE RP Include File Description

FILE NAME: THRU
PURPOSE: PROCESS ERROR INCLUDE FILE
LANGUAGE: VAX-11 COBOL

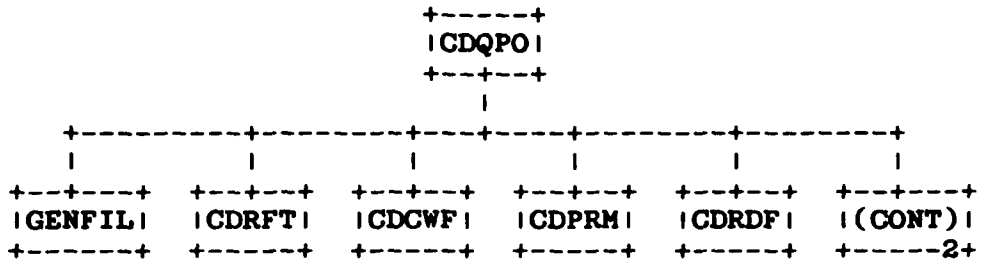
DESCRIPTION:

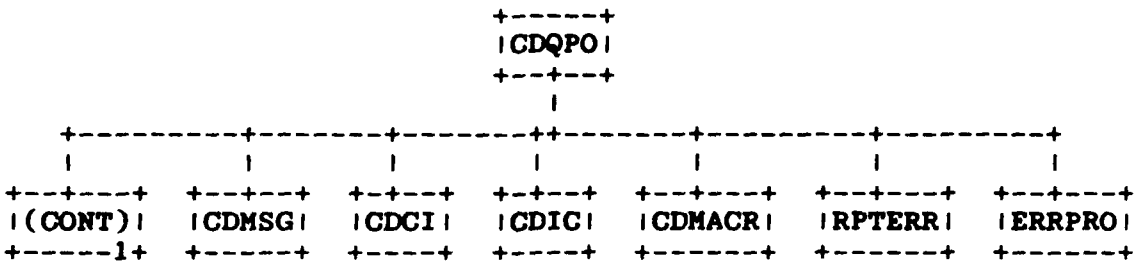
3.10.10 Hierarchy Chart

The following hierarchy charts show the relationships between all of the modules mentioned in the above documentation. A module may call a subroutine several times within its code, but the call will only be shown once as a single relationship on this hierarchy chart. All modules shown at the top of the first page are considered Main Programs as described in section 3.10.1 above.

There is an internal paging scheme as marked by the numbers in the upper right corner of each page. An index after the last page of the chart shows where a routine and its calls are first defined. If a routine has no page reference, it either makes no calls or is an external routine. A continuation box on the end of a tree limb shows where that the tree continues on the page numbered mentioned. A number in a box with a routine name points to the page where the routine is further defined within the hierarchy tree. If there is no number in a box, the routine either makes no calls or is an external routine.

1




CDQPO
(CONT)
CDMSG
CDCI
CDIC
CDMACR
RPTERR
ERRPRO

CDCI
CDCWF
CDIC
CDMACR
CDMSG
CDPRM
CDQPO.....1
CDRDF
CDRFT
ERRPRO
GENFIL
RPTERR

3.11 Program Listings Comments

This information is contained in the Module Descriptions in section 3.10.

SECTION 4

QUALITY ASSURANCE PROVISIONS

4.1 Introduction and Definitions

"Testing" is a systematic process that may be preplanned and explicitly stated. Test techniques and procedures may be defined in advance, and a sequence of test steps may be specified. "Debugging" is the process of isolation and correction of the cause of an error.

"Antibugging" is defined as the philosophy of writing programs in such a way as to make bugs less likely to occur and when they do occur, to make them more noticeable to the programmer and the user. In other words, as much error checking as is practical and possible in each routine should be performed.

4.2 Computer Programming Test and Evaluation

The quality assurance provisions for test consists of the normal testing techniques that are accomplished during the construction process. They consist of design and code walk-throughs, unit testing, and integration testing. These tests are performed by the design team. Structured design, design walk-through and the incorporation of "antibugging" facilitate this testing by exposing and addressing problem areas before they become coded "bugs."

* U.S.Government Printing Office: 1987 — 748-061/60925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